

How To Identify and Control **Noninfectious Diseases** of Trees



Noninfectious tree diseases are those **not** caused by fungi, bacteria, viruses, or nematodes. They can be caused by extremes in temperature, water supply, chemicals (both in the soil and the air), and transplant and mechanical injuries. These nonliving disease agents are a major cause of losses in both forest and landscape trees. Often the tree is weakened, enabling fungi and insects to enter and further injure or kill the tree.

Superficially, the symptoms of these “diseases” may resemble those produced by insects or fungi. But if closer examination fails to reveal the tell-tale signs of these organisms, you can be fairly sure your tree may be suffering from one of the ailments described here. And in most cases, prevention is the best control.

**North Central Forest Experiment Station
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St. Paul, Minnesota**

HIGH TEMPERATURE DISEASES

Heat Defoliation and Leaf Scorch

High temperature and drying winds cause rapid loss of water, especially in maple leaves. Leaf margins turn yellow or brown and leaves fall prematurely.



Water during periods of hot weather to prevent this on smaller trees.

Plant trees in locations protected from long exposure to sun and wind.

Heat Canker

This occurs on young trees and nursery seedlings when the soil surface becomes hot enough to kill tissue cells. A swelling of the stem above the injured tissue results.



Shade young trees in nursery beds for the first year or two to prevent this injury.

LOW TEMPERATURE DISEASES

Frost Injury

An early fall or late spring frost when trees are actively growing can injure or kill succulent stem tissue, leaves, and buds. Most trees can survive this injury, but their growth rates will be reduced.



Plant native species that have developed resistance to this injury.

Cover the trees if frost is expected.

Frost Crack

Both hardwood and softwood tree species are susceptible to this injury. A sudden, sharp drop in winter temperature causes the outer layer of wood to contract more rapidly than the inner layer, resulting in a long vertical crack in the trunk. Frost cracking can occur repeatedly in the same place causing a build-up of callus tissue, resulting in the formation of frost ribs.



No control is known.

DROUGHT

Drought symptoms are produced when loss of water through the leaves exceeds uptake of water by the roots. This is caused by inadequate soil moisture during extended periods of abnormally low rainfall. Symptoms include wilting, off-color foliage, and a general decline in vigor that may eventually kill the tree. Crowns of drought-stricken trees usually die from the tops down. Trees in this condition are more readily attacked by fungi and insects. Shallow-rooted trees are most susceptible to drought.



Do not plant shallow-rooted species in areas of low rainfall or on sandy soils.

Water ornamental trees once a week until adequate moisture is present in the root zone.

Conifers growing over high water tables for long periods may die shortly after the water table drops. The foliage turns red and drops off.

Needle Droop

Needle droop periodically occurs, primarily on red pine, as a result of sudden, rapid transpiration when soil is dry. In highly succulent tissue the result is a serious internal water deficit and loss of turgor, causing the tissue to collapse at the base of needles. The needles soon droop and die. In extreme cases the twigs may also die, but generally the buds will remain alive and develop normally the following spring. Damage to trees is usually light, resulting only in a slight growth reduction and temporary deformity.



No control is known.

WINTER INJURY

Winter Burn and Winter Drying

These are common problems on conifers. Winter burn causes a browning of needles during rapid temperature changes in winter, particularly on the south sides of trees where there is more exposure to the sun. Rapid temperature changes occur at sunset and sunrise or when sunlight is suddenly blocked by other trees, hills, or buildings.

Winter drying is caused by the desiccation of foliage and twigs by warm dry winds, when water conduction is restricted by the freezing of plant tissues, or by frozen ground. Reddening, browning, and, in some cases, drooping of foliage becomes apparent in late winter and early spring.

Often a combination of winter burn and winter drying will occur, occasionally complicated by drought. If severe enough, buds may be killed and later the affected branches. Sometimes the tree may die. Usually only a few buds are killed and trees produce new foliage. Some species of conifers are more resistant than others and should be planted where these conditions are common. This problem is particularly bothersome in ornamentals and Scotch pine Christmas tree plantations where production of dense healthy foliage is the primary objective. The Spanish variety of Scotch pine and, to a lesser extent, the French-green variety are susceptible. Longer-needled varieties of Scotch pine, such as the Scottish Highland, are resistant.



Avoid planting ornamental conifers where sudden temperature changes may occur.

If susceptible conifer trees are already in place, water and mulch around the trees in the fall to help prevent the soil from completely freezing in the rooting zone.

Wrap susceptible trees in burlap during winter to reduce loss of water from the foliage.



WINTER SUNSCALD

Occurs during late winter or early spring when temperature is above freezing during the day and below freezing at night. In the day, the tissues, warmed by the sun, become active. Freezing at night kills this tissue resulting in an elongated canker usually on the southwest side of the tree. Thin-barked trees such as maples are most susceptible to this type of injury.



Wrap the trunk with sisal kraft paper or other appropriate material to shade it and reduce the warming of the tissue during the day.

CHEMICAL INJURY

Chemical injuries may be caused by any one of several factors and are often difficult to distinguish from one another.

Carefully review recent chemical applications in the vicinity of the tree to identify the source.

Use chemicals carefully, and according to directions.

NUTRIENT DEFICIENCIES

Trees need certain minerals for proper growth. Nitrogen, phosphorous, and potassium are the most important. Depending upon which nutrient is lacking, symptoms vary from leaf-yellowing to a reduction in leaf size.

Have soil analyzed.

Apply commercial fertilizer at recommended rates.

HERBICIDE INJURY

Improperly applied herbicides can cause injury to trees. Leaves of deciduous trees will become distorted, curled, and turn brown on the margins. Conifer needles will turn yellow or brown and succulent shoots will curl or become deformed. Trees will usually survive, but their growth will be stunted.



Use herbicides carefully and according to directions.

SALT INJURY

Road deicing salt that blows onto the foliage or is absorbed through the roots will cause a browning of the tree on the side facing the roadway. Trees growing where salt accumulates due to drainage patterns will also be affected. The affected foliage will fall off in the spring and the new growth will make the tree appear healthy again. However, these trees will grow more slowly and remain stunted, and may eventually die if the accumulation continues.



Plant tree species resistant to salt injury.

Plant trees as far from roadways as possible.

AIR POLLUTION

Chemical pollutants emitted into the air from various manufacturing plants, automobiles, and heating plants can injure trees under certain conditions. These toxic compounds form in the atmosphere and can injure vegetation miles away from the source, so it is not always possible to determine their exact origin. When trees are injured by an air pollutant, symptoms characteristic of the specific compound usually develop. These symptoms may help diagnose the cause. Controls for these types of injuries will necessarily depend upon the cause.



Because of the complex nature of this type of injury, consult a qualified person skilled in identifying types of air pollution to obtain an accurate identification.

ADDITIONAL HELP

The causes of noninfectious diseases are often complex and difficult to identify. If you need additional help, contact your State's county, forestry, or plant pathology extension personnel. Federal land managers should contact State & Private Forestry, Insect & Disease Management Staff for assistance.

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